

IN THE CLAIMS:

Please amend claims 1, 2, 4, 6, 9, 10, 12, 13, 17, 21 and 29 and cancel claims 3, 5, 7, 8, 14, 15, 18-20, 22-28, and 30-74.

Claim 1 (Currently Amended): A method for estimating a the maximum discharge power of a battery, comprising:

generating a signal indicative of a present state-of-charge of said battery, utilizing a sensor;

calculating said present state-of-charge of said battery based on said signal, utilizing an arithmetic circuit operably coupled to said sensor;

calculating a maximum discharge current of said battery utilizing said arithmetic circuit based on at least a minimum state-of-charge limit associated with said battery, said present state-of-charge of said battery, and a minimum voltage limit limits-of associated with said battery such that a future output voltage of said battery does not fall below said minimum voltage limit and a future state-of-charge of said battery does not fall below said minimum state-of-charge limit associated with said battery; and,

calculating said maximum discharge power based on said maximum discharge current value, utilizing said arithmetic circuit.

Claim 2 (Currently Amended): The method of claim 1, wherein said step of calculating said maximum discharge current is also based on a maximum current limit associated with said battery further comprising:

calculating a maximum discharge current of said battery based on state-of-charge limits of said battery;

calculating a maximum discharge current of said battery based on current limits of said battery;

wherein said maximum discharge power is calculated from a minimum value of discharge current chosen among said calculated maximum discharge current based on voltage limits, said calculated maximum discharge current based on state-of-charge limits, and said calculated maximum discharge current based on current limits.

Claim 3 (Cancelled).

Claim 4 (Currently Amended): The method of claim 1, ~~2~~ further comprising calculating said present state-of-charge of said battery wherein said step of calculating maximum discharge current of said battery based on state of charge limits obtains a state of charge by using a Kalman filtering method.

Claim 5 (Cancelled).

Claim 6 (Currently Amended): The method of claim 1, ~~2~~ wherein said battery is a battery pack comprising at least one cell ~~n-cells~~.

Claims 7-8 (Cancelled).

Claim 9 (Currently Amended): The method of claim 1, wherein said step of calculating maximum discharge current of said battery is also based on ~~voltage limits~~ uses a cell model.

Claim 10 (Currently Amended): The method of claim 9, wherein said cell model is solved by a Taylor-series expansion.

Claim 11 (Original): The method of claim 9 wherein said cell model is solved by using a discrete time-state space model.

Claim 12 (Currently Amended): The method of claim 9 wherein said battery is a battery pack comprising at least one cell ~~n-cells~~.

Claim 13 (Currently Amended): The method of claim 12 wherein said cell model is

$$v_k(t+\Delta t) = OCV(z_k(t+\Delta t)) - R \times i_k(t)$$

wherein $v_k(t+\Delta t)$ denotes ~~the~~ a cell voltage for a cell k for the a time period Δt units into the future, $OCV(z_k(t+\Delta t))$ denotes an ~~the~~ open cell voltage as a function of a ~~state-of-charge~~ the state-of-charge z_k for cell k for a ~~the~~ time period Δt units into the future, R is a constant that denotes an ~~the~~ cell's internal resistance of said cell k , and $i_k(t)$ denotes a ~~the~~ cell current for cell k .

Claims 14-15 (Cancelled).

Claim 16 (Original): The method of claim 13 wherein said cell model is solved by using a discrete time-state space model.

Claim 17 (Currently Amended): The method of claim 16 wherein said discrete time-state space model is

$$x_k[m+1] = f(x_k[m], u_k[m])$$

$$v_k[m] = g(x_k[m], u_k[m])$$

wherein m denotes a ~~the~~ discrete time sample index, $x_k[m]$ denotes a ~~the~~ vector function of time and a ~~the~~ state of the battery system, $u_k[m]$ denotes an ~~the~~ input to the battery system and includes cell current $i_k[m]$ as a component, and $f(\bullet)$ and $g(\bullet)$ are functions chosen to model the cell dynamics.

Claims 18-20 (Cancelled).

Claim 21 (Currently Amended): The method of claim 17 wherein $i_{\max,k}^{dis,volt}$ is found by looking for i_k that causes equality in

$$v_{\min} = g(x_k[m+T], u_k[m+T])$$

wherein $g(x_k[m+T], u_k[m+T])$ is utilized to determine finds the cell voltage for the cell k at a predetermined time in Δt seconds into the future.

Claims 22-28 (Cancelled).

Claim 29 (Currently Amended): The method of claim 1, 2 wherein said calculated maximum discharge power is checked to ensure that it falls within power limits of said battery.

Claims 30-74 (Cancelled).

Please add new claim 75.

Claim 75 (New): A system for estimating a maximum discharge power of a battery, comprising:

a sensor configured to generate a signal indicative of a present state-of-charge of said battery; and

an arithmetic circuit operably coupled to said sensor, said arithmetic circuit configured to calculate said present state-of-charge of said battery based on said signal, the arithmetic circuit further configured to calculate a maximum discharge current of said battery based on at least a minimum state-of-charge limit associated with said battery, said present state-of-charge of said battery, and a minimum voltage limit associated with said battery such that a future output voltage of said battery does not fall below said minimum voltage limit and a future state-of-charge of said battery does not fall below said minimum state-of-charge limit, said arithmetic circuit further configured to calculate said maximum discharge power based on said maximum discharge current value.